ON THE POLITICAL ECONOMY OF LAND REFORM

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Abstract

We develop an approach to understand the role of autocratic land reforms to prevent democratic change. The autocrat confiscates and redistributes land in an attempt to secure his power, exploiting the endogenous social identities and loyalty in the population. The optimal land reform for the dictator balances the benefits of giving land to members of the elite to strengthen their support with the benefits of giving land to tillers to reduce their opposition against the autocratic rule. We show how autocratic land redistribution is more likely to increase land inequality further, the more unequal the land distribution is in the first place. While land to tillers is allocated in a way that increases inequality among them, land to the elite is allocated in a way that reduces the inequality within the elite.

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1 Introduction

Land redistribution is the the most consequential form of redistribution in the developing world, says Michael Albertus (2016), the author of a highly prized book on land reforms.[1] He estimates that 128 million hectares of land were expropriated and redistributed in Latin America from 1930 to 2008, and demonstrates that land reforms occur more often under dictatorship than under democracy. In this paper, we explore how an autocratic ruler can use land reform as a means to increase his power and to sustain his rule.

We start from a situation where the autocratic ruler is contested by a democratic opposition (for instance Mugabe's ZANU-PK faced with the Movement of Democratic Change in Zimbabwe). Should the autocrat weaken the antagonism of the opposition by allocating land to its members? Or, should he strengthen the loyalty of his supporters by giving land to them? In other words, what is in the best interest of the ruler: to prevent democracy by favoring his most likely supporters so they have more to lose from democratic reforms; or to favor his potential opponents so they have less to gain from democracy? And, would it benefit the ruler to give equally much land to everybody in the favored group, or to distribute the land more unequally within that group?

These questions are pertinent in discussions over land reforms in South Africa and Zimbabwe today and in several countries in Latin America. The questions are also relevant for the political economy of redistributing wealth and assets more generally whenever the incumbent party faces a more egalitarian challenger. Dicta-

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[1]His book Autocracy and Redistribution: The Politics of Land Reform (Cambridge University Press, 2015) won the 2016 Luebbert Book Award for the best book in comparative politics published in the previous two years, as well as the 2017 LASA Bryce Wood Book Award for the best book on Latin America in the social sciences and humanities.

torships with centralized authority without much of checks and balances facilitate land reform. This is particularly true in situations where the elite is split, as emphasized by Albertus (2015). In all cases, autocratic land reforms get a special form whenever they first and foremost aim at stopping a democratic change.

Typically, democratic policies entail a *continuous redistribution of the flow of earnings* via taxes and transfers, leaving the distribution of wealth more or less intact as wealth redistribution is easier to block. Continuous redistribution is prevalent in social democracies and Christian democracies in Europe where a higher inequality in the asset distribution to some extent is met by more redistribution of the flow of income.

Dictatorships, in contrast, have more *infrequent redistribution of the stock of assets* such as land, letting the distribution of earnings be what this distribution of assets implies. One reason why permanent redistribution of assets like landholdings can be more effective for an autocratic ruler than progressive taxes, we suggest, is that redistributing land implies that the autocratic ruler allocates advantages that would be more valuable under non-democratic rule than under democratic rule with its continuous redistribution. This is the logic we explore below where a land-rich elite fears the continuous redistribution under democracy, while workers and tillers would gain from this continuous redistribution.[2]

Yet, group behavior does not depend on economic self interests only. Group members have sympathies and ideologies that can vary within and across groups in ways that are not always in line with their common economic interests. We express all these sentiments and attitudes, including the commitments to demo-

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[2]In a country like Zimbabwe it is most productive to think of the land-rich elite not as the rich white farmers from the apartheid time, but rather as the emerging black landholders who took over some of the big landholdings that the white elite used to occupy.

cratic reforms, by what we call the individual loyalty to the present regime. To be loyal means that one is willing to sacrifice economic gains to preserve his rule, while being disloyal means that one must be compensated for being willing to keep him. Such sentiments are distributed across groups and within groups dependent on whether group members identify with the interests of own group and to what extent they are alienated from the interests of other groups.

The land distribution is likely to affect the distribution of group loyalty and its dispersion within groups. We suggest a simple principle where the loyalty to the autocratic ruler correlates negatively with the economic gains and losses from a democratic change. Those who gain from a democratic change tend to be less loyal to the ruler, while those who lose tend to be more loyal.

Our conception of loyalty can thus capture positive, or negative, sympathies. Loyalty can sometime trump economic interests. The loyalty towards the ruler among some tillers can for instance be so high that they are not joining the fight for democratic change, while the commitment to democratic ideals may be so high within segments of the elite that they work for democratic change in spite of their economic interests in retaining the present ruler.

When it is a combination of loyalty and interest that determines the support of the regime, minor changes in the economic gains and losses of a democratic transition can alter the support for democratic change substantially. The ruler can exploit this in reallocation land while still in power.

Exploring regime change, we combine economic interests (as measured by the gains or losses from a regime change) with loyalty (as measured by how much economic gains a person is willing to give up to retain the present ruler) to derive the endogenous net support for a democratic change. How much support the

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opposition needs to win, is uncertain. We capture this by asserting that the probability of a regime change is increasing in the net support for democratic change. We then use the links between land distribution and net support to derive the land allocation that most benefits the interests of the ruler.

Our most striking result is how an autocratic land reform easily can become inegalitarian: It might be beneficial for the ruler to allocate more land to the elite, while at the same time contributing to more inequality in landholdings and income within the working part of the population.

Showing this our paper builds on and contributes to several strands of the literature. First of all, our paper draws on the rich literature on land reforms, in particular on Albertus (2015), Bhattacharya, Mitra, & Ulubaşoğlu (2019), Boone (2007), Bardhan & Mookherjee (2010), Dasgupta & Ray (1986, 1987), Moene (1992). We add to this literature an insight of how the ruler can improve his chances to remain in power by a highly inegalitarian land reform. Our emphasis of how unequal landholdings can affect loyalty and either constrain, or induce, cooperation and group identification, connects to the literature on social identification, especially to the contributions of Akerlof & Kranton (2000), Shayo (2009), Besley & Persson (2009). In our approach group identity is both a cause to and consequence of the favored land reform by the ruler.

Our paper also joins up to the literature on endogenous ideology. Roemer (1985) rationalizes revolutionary ideology by deriving the future post revolution income distribution to which it is most beneficial for the rebels to commit - to win the struggle for the new society. Mehlum, Natvik, & Torvik (2021) rationalize social democratic ideology on public versus private sector by the endogenous support and structural change that the policies generate. Our case can be interpreted as

a rationalization of autocratic ideology and loyalty by deriving the distribution of land in the present regime and the sentiments that maximizes the survival chances of the dictator. We also characterize the autocrat's favored land allocation by the extent to which it relies on a 'dived and rule' strategy or a 'unite and rule' strategy, inspired by the contributions of Acemoglu, Robinson and Verdier (2004) and by Esteban and Ray (2001). Finally, the features of a polarization of both the land distribution and in the distribution of loyalty are inspired by Esteban & Ray, D. (1994, 2011).

The rest of the paper is organized as follows. In Section 2 we develop our approach, presenting the basics for our political economy model of land reform. We derive how the distribution of loyalty is determined, emphasizing the role of the distribution of land across groups and within groups, and how all group members are affected by the average loyalty within own group. In Section 3 we discuss the land reform that maximizes the ruler's pay-off, incorporating his chances to remain in power. We distinguish between allocations of a given amount of land across groups and within groups, and the case where the ruler optimally confiscates land for redistribution. Section 4 concludes. There is a comprehensive Appendix, however, that contains analytical results and more elaborations.

2 Land Distribution and Ruler Locality

Consider a country with an autocratic ruler who is contested by a movement for democratic change. There are two groups: the elite, consisting of of N_e members, and the tillers, consisting of $N_t > N_e$ members. How does the allocation of land and income affect the support towards the ruler? How should he redistribute land

to be more secure in his tenure?

2.1 Income and taxes

The description of income and taxes is highly stylized.

The initial land distribution has inequality both across groups and within groups. For society as a whole the average land holding is $\bar{L}$. Each member i of the elite has landholdings $L_e^i > \bar{L}$, and the average landholdings of the elite is denoted $\bar{L}_e$. Any member i of the tillers, in contrast, has landholdings $L_t^i < \bar{L}$, and the average landholdings of the tillers is given by $\bar{L}_t$. Within the group of tillers the variance of landholdings is σ_t^2 and within the elite the variance is σ_e^2.

The ruler has his own land $L_r > \bar{L}$. In addition, he has expropriated land which he allocates to individuals in order to attract more political support. Thus the final landholdings of each member of the two groups consists of their initial landholding plus the land allocated or confiscated by the ruler.

Production and income are proportional to land holdings. Hence, by a suitable choice of units and by normalizing the income of the landless to zero, the individual incomes before taxes are equal to individual land holdings. When taxes are used to redistribute income, it is done by a tax rate $\tau \geq 0$ on all incomes. Total tax receipts are redistributed equally to all citizens. Thus, without costs of taxation, the disposable income of an individual i in group $j \in \{e, t\}$, denoted Y_j^i, becomes

$$Y_j^i = (1 - \tau)L_j^i + \tau\bar{L} = L_j^i + \tau(\bar{L} - L_j^i). \tag{1}$$

The power to decide taxes remain in the hands of the autocratic ruler if he is able to fend off the movement for democratic change. As long as the autocrat remains in power, he follows the interests of the elite and sets a tax rate $\tau = 0$. If there is a regime switch to democracy, however, the tax rate will be determined by majority rule, i.e. by the tillers with less than average landholdings and income. They set $\tau = 1$. The corner solutions in each of the two regimes represent, in an oversimplified way, how democracy redistributes more income than autocracy. The chosen simplification is used to save on notations. Yet it is in line with the suggested principles of continuous versus infrequent redistribution.

2.2 Loyalty and political support

The support for the autocratic ruler can be derived from the economic interests of citizens combined with the political sympathies and antipathies that individuals have for the autocrat. We represent sympathies and antipathies by one variable, called loyalty, which can take positive and negative values.

Economic interests reflect individual gains and losses of introducing democracy. Since democracy gives everybody the average income $\bar{L}$ tillers have an economic interest of a democratic change since all of them have smaller landholdings than the mean. The elite has larger landholdings than the mean and all of its members thus prefer autocracy out of their economic interests.

Loyalty reflects either sympathy $x_j^i > 0$, or antipathy $x_j^i < 0$, with the autocratic ruler– sentiments that come in addition to the economic interests. We

measure the strength of positive or negative loyalty by how much the person is willing to give up, or is insisting to receive in compensation, to retain the ruler in power. The average loyalty to the ruler is μ_e for the elite and μ_t for the tillers.

To support the autocrat or not corresponds to whether the difference between economic interests and loyalty, $(\bar{L}-L_t^i)-Y_t^i$ for tiller i and $(\bar{L}-L_e^i)-Y_e^i$ for elite member i, is negative or or not. To make the political conflict between the two groups distinct, we assume that the average loyalty of the elite is sufficiently strong such that they on average prefer status quo to a democratic change, while the tillers, in contrast, do not on average have an loyalty to the ruler that outweights their average gain from democratic change. Accordingly, we assume

$$\bar{L}_e - \bar{L} + \mu_e > 0 \quad \text{and} \quad \bar{L} - \bar{L}_t - \mu_t > 0. \tag{2}$$

The spread of loyalty around the average levels is nevertheless important. The strength of loyalty has a cdf $F_e(\cdot)$ for the elite and $F_t(\cdot)$ for the tillers. Although the ruler is assumed to know these distributions he does not know each individual's level of loyalty.

The distribution of the support for democracy can be found by calculating, for each relevant land holding, the fraction of tillers and the fraction of the members of the elite who support democratic change, and the fractions that support the autocratic rule – and sum up the support for each.

Tillers with a landholding L_t^i supports democracy if their loyalty to the ruler is lower than the gains from democracy $(\bar{L} - L_i^t)$, implying that an expected fraction $F_t(\bar{L} - L_i^t)$ supports democratic change. Similarly, an expected fraction of $F_e(\bar{L} - $

L_e^i) of the elite with landholding L_e^i supports democratic change.

If the distributions of loyalty to the ruler is uniform with density h_t for the tillers and h_e for members of the elite (which we assume as an approximation to have a simple exposition), we have

$$F_j(x) = (x - \mu_j) h_j + \frac{1}{2} \quad \text{for} \quad \mu_j - \frac{1}{2h_j} < x < \mu_j + \frac{1}{2h_j} \tag{3}$$

which is supposed to hold[3] for $j = t, e$. We denote the number of tillers supporting democratic change by M_t and the number of elite members supporting democratic change by M_e, where

$$M_t = N_t \sum_{i \in t} F_t(\bar{L} - L_t^i) = N_t \left[(\bar{L} - \bar{L}_t - \mu_t) h_t + \frac{1}{2} \right] \tag{4}$$

$$M_e = N_e \sum_{i \in e} F_e(\bar{L} - L_e^i) = N_e \left[(\bar{L} - \bar{L}_e - \mu_e) h_e + \frac{1}{2} \right] \tag{5}$$

From (2), (4), and (5) we see that a majority of tillers supports democratic change, while a majority of the elite opposes it. Shortly, we return to how the average loyalty, μ_t and μ_e, depends on the distribution of land across groups, and how the density of the support within groups, h_t and h_e, depends on the distribution of land within the groups.

For now, however, these variables are parameters that affect the probability

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[3]As we proceed we focus on interior solutions where land distributions are such that they satisfy the inequalities in these expressions. Interior solutions simply means that by observing the land holdings of an individual this information is not by itself sufficient to determine with full certainty if an individual supports democratic change or autocratic rule. This assumption is fulfilled as long as the highest and lowest levels of land holdings within each group is "within the support of the distribution of loyalty" within each group. For each group $j \in \{e, t\}$ this requires that the lowest amount of land in the group is higher than $\mu_j - \frac{1}{2h_j}$ and the highest amount is lower than $\mu_j + \frac{1}{2h_j}$. For a sufficiently low h_j, for example, this will always be satisfied.

of democratic change for any given distribution of land. Solving the model, we also incorporate how the distribution of land affects these parameters and how the ruler can utilize these dependencies to best secure his power.

The probability of democratic change is determined by the effective support for democracy compared to the effective support for the autocratic rule. The political effort and effective influence can differ across groups as their position in society differs. The typical political effort is denoted δ_e for individuals in the elite and δ_t for the tillers. The values of he parameters δ_e and δ_t reflect differences in resources, access to the state apparatus, ability to organize, demonstrate or vote, and more generally being effective in influence activities.

The expected support for democratic change is now $Z_d = \delta_e M_e + \delta_t M_t$, while the expected support to autocratic rule is $Z_a = \delta_e(N_e - M_e) + \delta_t (N_t - M_t)$. To retain the autocratic power the effective opposition supporting the movement for democratic change cannot be too strong. The net democratic support $(Z_d - Z_a)$ must be below an uncertain threshold for the autocratic ruler to be able to remain in power. Accordingly, the probability of democratic change, denoted π, is an increasing function of this net democratic support, written

$$\pi = \pi \left(Z_d - Z_a \right) = \pi \left(2\delta_e M_e + 2\delta_t M_t - \delta_e N_e - \delta_t N_t \right) \tag{6}$$

with $\pi'(\cdot) > 0$ [4] and where we have written out the expressions of Z_d and Z_a in the last expression.

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[4] $\pi'(\cdot)$ is assumed to be continuous with a positive support on the interval $(-\delta_e N_e - \delta_t N_t, \delta_e N_e + \delta_t N_t)$.

2.3 Group cohesion and loyalty

To be loyal to the autocratic rule means to be devoted, or ardent, towards this social arrangement, its governance, and power structure. Such sentiments, however, come in degrees and we consider loyalty and disloyalty as ideological values that can be more or less firmly protected, or held. They can be based on beliefs shaped in part by how the system treats different groups and how members of different groups identify with, or become alienated from, other members and other groups.

A polarized distribution of loyalty and disloyalty can lead to antagonistic confrontations. The distribution is polarized if the mean loyalty of the groups are rather apart while there is little spread in the individual loyalty around the mean levels in each group.[5]

To formalize how the land distribution within and across groups are likely to shape the level of mean loyalty of a group and the individual conformity with this average level of loyalty within the group, we assert a simple, but reasonable, behavioral principle: *the loyalty to autocratic rule correlates negatively with the economic gains and losses from a democratic change.* Hence, those who gain from a democratic change tend to be less loyal to the ruler, while those who lose tend to be more loyal. The relevant gains and losses are captured by the difference between average landholding and own landholding. Loyalty should be non-increasing in this difference as well. Yet, there are social effects within each group in the sense each group member tends to be affected by the average loyalty to the ruler within the group.

As an example, let the loyalty of person i in group j be a linear function of

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[5]Polarization measures are thoroughly discussed and explicitly derived in the seminal contribution by Esteban and Ray's (1994).

the group mean in loyalty μ_j and the deviation in landholdings from the country mean (the economic gain of democracy):

$$Y_j^i = c_j + b_j \mu_j - a_j(\bar{L} - L_j^i) \tag{7}$$

with a_j, b_j and c_j constants where $a_j \geq 0$ and $b_j \in (0,1)$. A high positive value of c_e means a strong ideological bias of the elite in favor of autocracy, while a high negative value of c_t indicates a strong ideological bias of the tillers in favor of democracy. A high value of b_j in either group means that there are strong preferences for ideological consonance where everybody would like to be close to the mean ideological position inside the group. A high value of a_j implies that an increase in the variance of landholdings within the group has a great impact on the dispersion of ideological loyalties.

In the example, the mean loyalty in group j is linearly dependent on the gap between the mean landholding in the country and the mean holding in the group as by taking the average on both sides of the equality and solving we obtain

$$\mu_j = \frac{c_j}{1 - b_j} - \frac{a_j}{1 - b_j}(\bar{L} - \bar{L}_j) \tag{8}$$

Recalling that σ_j^2 denotes the variance of the landholdings in group j, the variance of loyalty in the group can thus be written $a_j^2 \sigma_j^2$. Now, since the variance in our uniform distribution of loyalty is $1/(12h_j^2)$, we have

$$h_j = \frac{1}{a_j \sigma_j \sqrt{12}} \tag{9}$$

Accordingly, the density of sympathies depends negatively on the spread of the

land distribution in each group $j = e, t$.

In this example, the indirect effects inside each group are two-fold: i) as the mean support inside the group changes each individual support is affected; ii) as long as the distribution of loyalty remains uniform, a change in the distribution of land alter the ideological position of in principle all group members to retain the uniformity of the distribution.

We use the example to assert

$$\mu_j = \mu_j \left(\bar{L}_j - \bar{L} \right) \quad \text{with} \quad \mu_j'(\cdot) > 0 \text{ and } h_j = h_j(\sigma_j) \quad \text{with} \quad h_j'(\cdot) < 0 \qquad (10)$$

based on the simple association between loyalty and how each landholding deviates from the average landholding. Extreme values of μ_j (either positive or negative) are associated with strong ideological biases. High values of the $\mu_j'(\cdot)$ indicates strong norms of ideological consonance within the group, while high absolute values of $h_j'(\cdot)$ indicate a low sensitivity to the land distribution within the group.

As long as this simple association holds, intra-group differences in loyalty tend to be small when the material conditions are similar within the group. Our simple principle is also in accordance with observations that economically homogeneous groups have more cohesion and more strongly share the same ideological values of sympathies and antipathies. The smaller the economic differences within a group, the more each individual member conforms to the median levels of values and loyalties in the group.

A polarized land distribution, in our setting, is equivalent to a high average rich-poor gap in landholdings $(\bar{L}_e - \bar{L}_t)$ and low values of σ_e and σ_t. Accordingly, polarization in the distribution of landholdings and income is associated with a

high average loyalty-gap $(\mu_e - \mu_t)$ across groups and high concentration of group members around the ideological sentiments of their group (as captured by high values of h_e and h_t). We associate these characteristics with a high alienation across groups and a high ideological identification within groups. These corollaries are used when we interpret the effects of land reforms.

3 Land reforms

An autocratic land reform in our context is a redistribution of land that best secures the power of the ruling regime against the challenges from the movement for democratic change. Analytically we divide the problem in two parts. First, we discuss the autocratic land allocation principle in which the ruler allocates a *given* amount of land to maximize his survival. Next, we discuss *how much land* the ruler should confiscate, and from whom, given that the confiscated land should be allocated according to the autocratic land allocation principle.

3.1 The pay-off to the autocrat

We focus on subgame perfect equilibria of the game of distributing land to obtain support. Accordingly, the ruler decide how much land to allocate to different individuals in society, taking into account how the new land distribution affects his political support.

The timing of events is as follows:

1. The ruler designs the land reform, i.e. the land allocation principle and the land grabbing principle.

2. Members of each group decide individually to support the autocratic ruler or to support democratic change where given these choices the probability of a democratic change is given by π in (6).

3. If the autocratic ruler wins, he determines the tax rate ($\tau = 0$ as shown). If the movement for democratic change wins, the tax rate is decided by majority rule ($\tau = 1$ as shown).

The income of the ruler, narrowly defined, is simply the same as everyone else under democracy. Under autocracy, however, his income consists of the income of the land he holds after land reform L_r, plus other rents of being in power which we denote by R. Since part of the income of the ruler arises from his landholdings which exceeds $\bar{L}$, this implies that the autocrat has higher pay-off under his own rule than under democracy.

The expected income of the ruler V is given by

$$V = (1 - \pi)(R + L_r) + \pi\bar{L} = R + L_r - \pi\left(R + L_r - \bar{L}\right) \tag{11}$$

We consider first the autocratic land allocation principle where the ruler allocates a *given* amount of land to maximize V in (11). This maximization problem is equivalent to minimizing the probability of democratic change π since the amount of land that is allocated is given exogenously. This simplifies the maximization problem.[6] Still, the maximization problem is a bit involved as the ruler takes into account how the distribution of land to each individual is expected to affect not only the political support and loyalty from that individual itself, but also how it

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[6]In the Appendix we extend the basic model to have the land used for land reform endogenous, and then this simplifying feature no longer holds.

affects group support via all the changes in loyalty.

Since there are $N_e + N_t$ individuals that the ruler must consider to distribute extra land to, we have a Kuhn-Tucker maximization problem with $N_e + N_t$ first order conditions that have to be fulfilled.

Before we discuss the results — that are formerly derived in the Appendix — observe that the motivation of the ruler to give land to members of the tillers and members of the elite are rather different. Although members of the elite gain economically if the ruler stays in power while tillers gain economically if there is democratic change, both groups include supporters of the ruler as well as supporters of democratic change. Giving land to a member of the elite serves the ruler because the expected support of the ruler increases. Giving land to a tiller, in contrast, serves the ruler because the expected support for democratic change declines.

Land to the elite is, in other words, a *divide and rule* strategy since it widens the gap between the rich and the poor and raises the polarization in the land distribution. With more land in the hands of the elite group they have more to lose from a democratic change. Therefore they support the ruler even more. Land to tillers, in contrast, is a *unite and rule* strategy since it narrows the gap between the rich and the poor and reduces the polarization in the land distribution. With more land they have less to win from democratization. Therefore they support the movement for democratic change less.

There are two basic distinctions that play an essential role: changes in the land distribution between groups and changes in the land distribution within groups.

3.2 Autocratic land allocation

It is when a ruler is most insecure in power that he is likely to undertake the most comprehensive land reforms. A ruler who is more secure, in contrast, is likely to undertake more modest reforms if any at all.

An almost certain democratic change in the future means that the cost of redistributing land today is close to zero for the autocrat since democracy would eliminate (most of) the benefits of large landholdings. Thus, it is when the ruler is weak we should observe comprehensive land reforms, while it is when the power of the ruler is not contested we should observe the minor or no reforms.

Redistribution within groups of a given amount of land:

We first consider within group land allocations. How does the autocratic land reform affect the inequality of landholdings within groups? One basic result is this:

If the ruler allocates land to both groups he would allocate the land in such a way that the inequality of landholdings within the elite is reduced, while the the inequality of landholdings within the group of tillers is increased.

Since the implicit group identification is stronger when a group is more similar in terms of material conditions, distributing land in this way ensures that group loyalty increases within the elite, while group loyalty decreases among the tillers. For the ruler it is an advantage to make group identification to the mean loyalty stronger within the elite and weaker within the group of tillers. The group with a majority of its members in support of autocratic rule becomes stronger, while the group with a majority of its members in support of democratic change becomes

weaker. Thus land redistribution to the elite will be progressive and equalizing, while land redistribution to the tillers will be regressive and dis-equalizing.[7]

Redistribution between groups of a given amount of land

One basic result is this: *The higher the initial land inequality, the more likely it is that the elite receives land and the less likely it is that the tillers receive land.*

This claim implies that the initial land inequality breeds further inequality when the autocratic ruler allocates land to secure his power. A high rich-poor gap in the ownership of land makes the divide and rule strategy cheaper and the unite and rule strategy more expensive.

When members of the elite have much land and tillers have little, it requires less additional land to achieve the politically optimal land allocation of a group. Therefore, when the elite has much land and the tillers have little land, the strategy of giving land to elite members is cheap relative to giving land to tillers. Thus, with high initial land inequality between groups, the divide and rule strategy becomes relatively inexpensive, while it is relatively costly to undertake the unite and rule strategy.

Unlike many models of electoral competition in democracies – where a higher inequality leads to more progressive redistribution – our model of autocratic support generates the opposite result: initial inequality induces regressive redistribution, while initial land equality induces further progressive redistribution.

One reason why inequality is reinforced by the autocratic land allocation is that

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[7]As we show in the Appendix, however, there is a strong argument for the ruler not to give a sufficient amount of land to tillers to make them part of the elite. The intuition for this is that such a move would decrease inequality among tillers and increase it among elites, which is the opposite of what is politically efficient for the ruler.

the autocrat competes against the (full) equality of democratic rule. To prevent the support for democratic change the ruler has to allocate land to the rich to increase their support rather than giving land to the tillers where it takes more to prevent them from going for the egalitarian democratic rule.

Also other differences across groups matter for the redistribution of land between them. We first consider differences in the expected political influence of groups. The ruler has an interest in allocating more land to the group with higher political influence, or effort, (i.e. groups with higher is δ_j).[8] Thus, if the elite is most politically active, *divide and rule* tends to become a more attractive strategy, while if it is the tillers that are most politically active, *unite and rule* tends to be more attractive. Consequently, if the elite better can solve its collective action problem than the tillers, say because they are a smaller group, this ability pulls in the direction of favoring the elite in the land reform.

An related effect stems from differences in group size. A group with many members N_j is more likely to be allocated land simply because they are numerous. When the group identification of all group members is affected by the allocation of land, giving land to an individual in a large group is more politically efficient than allocating land to an individual of a small group and this effect is stronger the stronger the norm of ideological consonance within the group.

This result is in contrast to other approaches to income or asset redistribution. Normally, the cost of giving a unit of land is the alternative value of the land. In our approach the political benefit comes not only from the individual who

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[8]In this, and in the subsequent explanation of the intuition behind our results, by the statement that "the ruler allocates more land to a group", we mean that (i) more land is given to a group relative to the other, and (ii) that a group is more likely to receive all the land that the ruler distributes. As we show in the Appendix, these two ways that a group is allocated more land is governed by the same parameters.

receives the land, but also from the higher support, or lesser opposition, from all other members of the group as long as average group loyalty affect the individual attitudes.

The initial within group inequality is also important for how land is distributed across groups. The ruler would allocate more land to a group the lower is its initial level of land inequality (i.e. the lower is σ_j). This is so since economic equality fosters group consonance in loyalty or disloyalty to the ruler. Thus, economically homogeneous groups can be a more powerful political force and the ruler therefore caters to groups with low land inequality to win their members over to his side. By this argument it follows that a large group of almost land-less tillers is likely to be favored also by autocratic land reforms.

Similarly, the more strongly the within group inequality affects group identification, the more land a group will receive (i.e. the higher is h'_j). When a group member is allocated land in a way that reduces inequality within the elite or increases inequality within the tillers, then not only the group identification of that individual alone is affected. Since elite members become more homogeneous and the tillers more heterogeneous when the ruler (optimally) allocates land, group identification for all group members is affected. Thus, if the group identification of a group responds strongly to within group inequality, then in political equilibrium this group is more likely to be allocated land.

Groups where reciprocity responds strongly to favorable treatment (i.e. the higher is μ'_j) are also more likely to get land. The intuition is that such a response raises the ruler's prospects of remaining in power.

The ideological bias of a group and its norms of ideological consonance can also be decisive. Groups that are more politically biased are more likely to get

land. This also contrasts with much standard political economy models, where loyal (or disloyal) groups are not favored politically, but rather groups of voters easily swing their votes. The intuition for our result is that when a group is loyal, then affecting group loyalty is more favorable for the ruler. If elites are very loyal, many of them supports him, and land allocations that increases the homogeneity of the group is beneficial because it increases the political strength of a group in which many have "the right" political attitude.

Similarly, if tillers are very ideologically biased against the ruler, then increasing group heterogeneity among them is beneficial because it weakens the political power of a group where many have, again from the point of view of the ruler, "the wrong" political attitude. Thus, the ruler rewards groups that are very strongly opposed to him, or very strongly aligned with him.

Redistribution with endogenous land confiscation

When the land to be redistributed is endogenous, the land reform both takes land from somebody and allocated it to somebody else. One basic result in this case is this:

The effects of the reform are based on the exact same trade-offs as those we have discussed above, the difference is only a magnification of the effects.

The reform becomes more dramatic with stronger consequences for individual land holdings. For instance, if land reform increases inequality across groups, this effect is now stronger since groups not only risk to be left-out in the land allocation. Their land can be confiscated.

Now, is the land confiscation likely to follow a progressive scheme in the sense that land is taken from the land rich and allocated to the land-poor? In other

words: does the land reform that benefits the ruler the most satisfy the Pigou Dalton principle of inequality reducing transfers?

The autocratic land reform can often violate the Pigou Dalton principle – in an interesting manner. Consider for example initial distributions of land and loyalty implying that the autocratic land reform expropriates land from both the elite and the tillers. When this is the case, the land confiscated from members of the elite is taken from the elite members with the largest landholdings, while the land confiscated from the tillers is taken from the tillers with smallest plots of land.

4   Conclusion

We have tried to make a case for the proposition that autocratic land reforms can be inequality enhancing rather than egalitarian. Focusing on situations where the ruler is challenged by a democratic movement, the rulers favored land reform is designed to preempt the support for democracy and to increase the chance to remain in power.

The autocrat can confiscate land from members of different groups and allocate it across and within groups. The redistribution of land affects not only earnings, but also ideology, social identity and the cohesion within groups with clear implications for how loyal members of different groups are to the autocratic regime. His intentions are not the same for all groups and for all members of a given group.

Allocating land to a member of the elite, for instance, serves the ruler because it raises the support for his autocratic rule. Yet, it matters a lot who in the elite gets the land. The loyalty and support of that group to the ruler goes most up when the land reform reduces the inequality of landholdings within the elite making it

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more cohesive and stronger.

Allocating land to a tiller, in contrast, serves the ruler because the support for democratic change declines. The support and loyalty for democratic change goes most down when the land reform increases the inequality of landholdings within the group of tillers making the group tiller less cohesive and weaker.

Combining the two features, we find that for a range of initial distributions of landholdings and loyalty the autocratic land reform would take land from both ends of the total land distribution and give it to either the better-off tillers, or the worst-off elite members, or both. This ends-towards-the-middle-redistribution implies that the poorest become poorer and the richest not so well-off as before. The beneficiaries are economically placed at the bottom of the land distribution of the elite and at the top of the land distribution of the tillers.

We also show that there can be a strong reinforcement of inequality across groups. The higher the initial land inequality, the more likely it is that the elite receives land and the less likely it is that the tillers receive land. When this is the case there can be a strong *trickling up* effect of autocratic land reforms: land is expropriated from the poor tillers and allocated to elite.

We have derived these results within a highly stylized model. The results generated are nevertheless of interest for further empirical explorations.

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A Appendix:

Analytical solution an further elaborations

Without loss of generality, we designate numbers to all of the individuals i such that the higher the initial land holding of an individual, the lower the assigned number to that individual. This implies that an agent with a higher number cannot initially have strictly higher land holdings than an individual with a lower number. As will be seen, land reform will not affect this ordering. To simplify notation, we incorporate already at this stage that land reform does not change the relative position of any individual. This implies that the individuals $\left\{ L_1^e, ..., L_{N_e}^e \right\}$ constitute the (land holdings of) members of the elite, while $\left\{ L_{N_e+1}^t, ..., L_{N_e+N_t}^t \right\}$ constitute the group of tillers. The land holdings L_i^j of each individual is the initial land the individual holds, which we denote by $\tilde{L}_i^j$, plus the eventual land allocated from the ruler. Thus $L_i^j \geq \tilde{L}_i^j$. The ruler has $\tilde{L}_r$ units of land that he distributes:

$$\sum_{i \in [1,...,N_e+N_t]} (L_i^j - \tilde{L}_i^j) = \tilde{L}_r, \quad j \in [e, t]. \tag{A.1}$$

The expected income of the ruler is given by $(1 - \pi)(R + L_r) + \pi \bar{L} = R + L_r - \pi \left(R + L_r - \bar{L} \right)$. The ruler maximizes this with respect to the land holdings of all individuals, given the amount of land he has available for distribution from (A.1), given that the transition probability for democratic change is given by (6) and given that all the individual holdings weakly exceeds initial land holdings. The

program of the ruler can thus be written as:

$$\max_{\left\{L_1^e,...,L_{N_e}^e,L_{N_e+1}^t,...,L_{N_e+N_t}^t\right\}} R + L_r - \pi\left(R + L_r - \bar{L}\right) \text{ subject to (A.1), (6), and}$$

$$\left\{L_1^e, ..., L_{N_e}^e, L_{N_e+1}^t, ..., L_{N_e+N_t}^t\right\} \geq \left\{\tilde{L}_e^2, ..., \tilde{L}_e^n, \tilde{L}_c^{n+1}, ...\tilde{L}_c^N\right\}. \tag{A.2}$$

Inserting from (6), this is a Kuhn-Tucker maximization problem. Denoting the multiplier on the (binding) constraint (A.1) by λ, and on the $N_e + N_t$ constraints $L_i^j \geq \tilde{L}_i^j$ by λ_i, and by recalling that $\bar{L}_j = \frac{\sum_{i \in j} L_i^j}{N_j}$, the first-order conditions are that the derivatives of the maximization problem with respect to L_i^j must satisfy the following $N_e + N_t$ first order conditions:

$$\left(R + L_r - \bar{L}\right)\pi'\left(\cdot\right)\left[2\delta_e\left(h_e + h_e\mu_e' - N_e\left(\bar{L} - \bar{L}_e - \mu_e\right)h_e'\frac{d\sigma_e}{dL_i^e}\right)\right] - \tag{A.3}$$

$$\lambda + \lambda_i = 0, \qquad \text{for} \quad i = 1, ..., N_e$$

and

$$\left(R + L_r - \bar{L}\right)\pi\left(\cdot\right)\left[2\delta_t\left(h_t + h_t\mu_t' - N_t\left(\bar{L} - \bar{L}_t - \mu_t\right)h_t'\frac{d\sigma_t}{dL_i^t}\right)\right] - \tag{A.4}$$

$$\lambda + \lambda_i = 0, \qquad \text{for} \quad i = N_e + 1, ..., N_e + N_t$$

These first order conditions are intuitive. Consider, for example, (A.3). The term $\left(R + L_r - \bar{L}\right)$ is the increase in payoff for the ruler if autocracy remains compared to when it does not. $\pi'\left(\cdot\right)$ is the pdf of the probability distribution that there is democratic change, and the collection of terms in the bracket

$\left[2\delta_e \left(h_e + h_e\mu'_e - N_e \left(\bar{L} - \bar{L}_e - \mu_t \right) h'_e \frac{d\sigma_e}{dL^i_e} \right) \right]$ is the total loss in support for democracy when elite individual i gets more land. Thus the first expression of the left side of (A.3) constitute the expected increase in payoff for the ruler by allocating one more unit of land to elite agent i. There are three effects at play, which can be identified by the three terms in the parenthesis $(\cdot)$ inside the bracket $[\cdot]$. First, giving more land to an elite agent implies that the elite agent has, in economic terms, more to lose from democratic change, and consequently that the probability that this particular elite individual supports the ruler increases. Thus, on an expected basis, the probability of democratic change decreases, and the expected payoff of the ruler increases. This is represented by the first term h_e in the parenthesis inside the bracket. Second, giving more land to the elite members increases the average loyalty of the elites. This increases the expected probability that the ruler remains in power further, and thus increases his expected payoff. This effect is represented by the second term $h_e\mu'_e$ in the parenthesis inside the bracket. The third effect is represented by the third term $-N_e \left(\bar{L} - \bar{L}_e - \mu_e \right) h'_e \frac{d\sigma_e}{dL^e_i}$ in the parenthesis inside the bracket. Note that since for elites we have $\left(\bar{L} - \bar{L}_e - \mu_e \right) < 0$, and we also have $h'_e < 0$, the effect of this term is positive for the expected payoff of the ruler if the inequality within the elite is reduced $\left(\frac{d\sigma_e}{dL^e_i} < 0 \right)$, while it is negative if the inequality within the elite increases. The intuition for this is that, since inside the elite there is a majority of supporters of the ruler, lowering the spread of land inequality within the elite makes group identification stronger, and increases the strength of political support for the ruler.

The intuition for the first order conditions (A.4) for the tillers is similar, with two exceptions. First, while an elite member (on an expected basis) is more likely to support the autocrat because he has *more to lose* from democracy, a tiller is more

likely to support the autocrat because he has *less to gain* from democracy. Thus, while the motivation for the ruler to give land to elites is to strengthen support, the motivation for giving land to tillers is by weakening opposition. Second, by the fact that $\left(\bar{L} - \bar{L}_t - \mu_t\right)$ has the opposite sign from $\left(\bar{L} - \bar{L}_e - \mu_e\right)$, the effect of within group inequality also has the opposite sign. While it is an advantage for the ruler to make group identification *stronger* among the elites, is an advantage for the ruler to make group identification *weaker* among the tillers.

We now characterize the solution of the model that follows from the first order conditions (A.3) and (A.4). When the ruler decides on the allocation of land there are more broadly two dimensions to consider; land distribution between groups and land distribution within groups.

A.1 Distributing Land Within Groups

Note first that if an individual i has $\lambda_i = 0$ then the land constraint for this individual is not binding, with the implication that this individual is allocated more land from the ruler. Conversely, if the individual has $\lambda_i > 0$, then the land constraint for this individual is binding, with the implication that the individual will not receive land from the ruler.

The most efficient way to characterize the equilibrium is to start out by characterizing the within group land distribution. Thus assume, for now, that some members of both groups will receive land from the ruler. We start out with the elites, and ask which elite individuals the ruler will give land to. Consider two elite members, termed elite member i and j. The relevant first order conditions for these two elite members are given by (A.4). By substituting for λ in one of

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these two first order conditions from the other, it follows that

$$\left(R + L_r - \bar{L}\right) \pi\left(\cdot\right) \left[-2\delta_e N_e \left(\bar{L} - \bar{L}_e - \mu_e\right) h'_e \left(\frac{d\sigma_e}{dL_i^e} - \frac{d\sigma_e}{dL_j^e}\right)\right] + \lambda_i - \lambda_j = 0.$$

(A.5)

Note that it follows from this, since $-2\delta_e N_e \left(\bar{L} - \bar{L}_e - \mu_e\right) h'_e < 0$, that

$$sign\left(\frac{d\sigma_e}{dL_i^e} - \frac{d\sigma_e}{dL_j^e}\right) = sign\left(\lambda_i - \lambda_j\right).$$

(A.6)

Consider first the case where both of these elites receive land from the ruler. This implies that $\lambda_i = \lambda_j = 0$, which from (A.6) again implies that $\frac{d\sigma_e}{dL_i^e} - \frac{d\sigma_e}{dL_j^e} = 0$, i.e. that (in equilibrium) the effect of the inequality measure of giving land to these two elite members is the same. This has a stark implication: since the land inequality measure is only affected by land holdings and not, in itself, by the particular identity of the land holder (other than through the effect of the land holdings of the individual), it follows that those elite members that are allocated more land from the ruler will all end up with the same land holdings. This is the only way the marginal effect of land on the inequality measure can be the same across elite individuals that receive land.

The remaining issue, however, is which of the elites that will receive land from the ruler. To characterize this decision, note that another implication from (A.6) is that if $\lambda_i = 0$ while $\lambda_j > 0$, i.e. if the ruler gives land to elite member i but not to elite member j, then $\frac{d\sigma_e}{dL_i^e} < \frac{d\sigma_e}{dL_j^e}$. In allocating land between two elite members, the ruler shall give land the elite members in such a way that inequality is reduced (as much as possible).

It follows from this that for a given amount of land that the ruler allocates to the elites (note that this amount of land is yet to be determined), the ruler gives land to the elite members that has the lowest amount of land before the land reform. Moreover, all the elite members that are given land end up with the same amount of land after the reform. Finally, for a given amount of land, the number of elite members that receive land is then also determined by the same logic, i.e. that the ruler continues to allocate land from the bottom of the elite land distribution until the available amount of land to elites (still to be determined) has been allocated.

Moving on to the tillers, we now establish which of the tillers will receive land (again, for now given that some tillers receive land). Thus consider two members of the group of tillers, termed tiller member i and j. The relevant first order conditions for the ruler as regards these two tillers are given by (A.4). In the same way as for the elites, by substituting for λ in one of these two first order conditions from the other, it follows that

$$\left(R + L_r - \bar{L}\right) \pi\left(\cdot\right) \left[-2\delta_t N_t \left(\bar{L} - \bar{L}_t - \mu_t\right) h'_t \left(\frac{d\sigma_t}{dL_i^t} - \frac{d\sigma_t}{dL_j^t}\right)\right] + \lambda_i - \lambda_j = 0. \quad \text{(A.7)}$$

Now, however, since $-2\delta_t N_t \left(\bar{L} - \bar{L}_t - \mu_t\right) h'_t > 0$, the opposite result from that in (A.6) follows, namely:

$$sign\left(\frac{d\sigma_t}{dL_i^t} - \frac{d\sigma_t}{dL_j^t}\right) = -sign\left(\lambda_i - \lambda_j\right). \quad \text{(A.8)}$$

Again, if both tillers receive land from the ruler we have $\lambda_i = \lambda_j = 0$ and thus

$\frac{d\sigma_t}{dL_i^t} - \frac{d\sigma_t}{dL_j^t} = 0$. It follows that all tillers that are allocated more land from the ruler will end up with the same land holdings. In contrast to above, however, now if $\lambda_i = 0$ while $\lambda_j > 0$, i.e. if the ruler gives land to tiller i but not to tiller j, then $\frac{d\sigma_e}{dL_i^e} > \frac{d\sigma_e}{dL_j^e}$. In allocating land between tillers, the ruler shall give land to the tillers in such a way that land inequality is increased as much as possible. Thus, as with the elite members receiving land, also all of the tillers that receive land from the ruler will end up identical land holdings. But now it will be those with most land, rather than those with least land, that will receive land. The reason is that this is the most efficient way for the ruler to weaken opposition since by increasing within tiller inequality, then the group loyalty is weakened, which is an advantage for the ruler since the group of tillers have a majority that prefers democratic change.

Note also from the above that another result follows, namely that there is a discontinuous drop in the utility of the ruler if he pushes a tiller over to becoming an elite individual (i.e. gives him the extra small amount of land that results in this individual shifting group membership). To see this, observe that when the ruler pushes a tiller over to the elite by giving him the sufficient amount of land, then the shift of this person from the tiller to the elite group increases land inequality among the elites and decreases land inequality among the tillers. As we have seen, both effects on land inequality is the opposite of what is in the interest of the ruler. Thus, this speaks against the ruler giving an amount of land to a tiller so that this tiller ends up as an elite member.[9]

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[9]Note, however, that under some special conditions the ruler may still end up doing this. For instance, in general we can not rule out such a case if the ruler has much land to distribute, the elite individuals are very few, and elites are much more politically active than the tillers. Since pushing tillers over to becoming elites occur only under very spesific assumptions, we do not pursue this further.

A.2 Distributing Land Between Groups

Let us next characterize the decision to which group to allocate how much land. The ruler may give land to members of the elite group, to members of the tiller group, or to members of both groups.

Let us first start out in the situation where the ruler gives land to only one group, and characterize which group this will be. By substituting for λ from one of the two first order conditions (A.3) and (A.4) and inserting in the other, it is evident that this is more likely to be to the elite group if (ceteris paribus) $\delta_e \left(h_e + h_e \mu'_e - N_e \left(\bar{L} - \bar{L}_e - \mu_e \right) h'_e \frac{d\sigma_e}{dL^e_i} \right)$ is high, while it is more likely to be to the tiller group if (ceteris paribus) $\delta_t \left(h_t + h_t \mu'_t - N_t \left(\bar{L} - \bar{L}_t - \mu_t \right) h'_t \frac{d\sigma_t}{dL^t_i} \right)$ is high. From this, several results follow.

First, the higher is δ_e relative to δ_t, the more likely it is the elite group that is allocated land from the ruler. The intuition for this is that increasing the utility of the group which has the highest political effort is most profitable for the ruler, as this has the strongest effect on the survival probability of autocracy. Again, if this is the elites, then their political effort in preventing democratic change increases by much. If it is the tillers, then their effort in working for democratic change decreases a lot.

Second, the higher is $h_e = h_e(\sigma_e)$ relative to $h_t = h_t(\sigma_t)$, the more likely it is the elite group that gets land. The ruler more effectively affects fights a movement of democratic change if he allocates land to the group with the lowest within group inequality. The intuition for this is that since this group is more homogeneous, it turn makes them a more powerful political force. Thus within group equality makes a group more politically powerful, in turn increasing the

likelihood of receiving favorable treatment from the ruler.

Third, the higher is μ'_j, the more likely it is that group j is favorably treated. Thus groups where reciprocity responds strongly to favorable treatment is also more likely to get such treatment. Again, of course, the intuition for this is that such a response allows the ruler to more strongly increase his prospects of continuing as ruler by allocating land to a group.

Fourth, the more strongly the within group inequality affects group identification, i.e. the higher is h'_j, the more likely is group j is to be the group that receives land. This is due to the fact that when a group member is allocated land in a way that reduces inequality within the elite or increases inequality within the tillers, then not only the group identification of that individual alone is affected. Since elites become more homogeneous and the tillers more heterogeneous when the ruler (optimally) allocates land, group identification for all group members is affected. Thus, if the group identification of a group responds strongly to within group inequality, then in political equilibrium this group is more likely to be allocated land.

Fifth, for the same reason, a group with many members N_j is more likely to be allocated land. When the group identification of all group members is affected, a large group becomes a more powerful political force than a small group.

Sixth, also for a similar reason, a group with strong ideological bias is more likely to receive land (i.e. if the average loyalty of the elite is positive and the average utility of the tilers is negative, then the higher is the absolute value of μ_j). This ensures that by giving land to elites, then the ruler is actually giving land to a group with a high share of supporters. Giving land to elites then is a will targeted policy instrument, which makes it more attractive to use for the ruler.

Likewise, when the tillers are ideologically biased against the ruler, then most of the tillers are supporters of democratic change. Then, allocating land to this group is a targeted policy instrument in order to decrease opposition against the ruler

Next, we characterize the situation where the ruler allocates land to members of both the elite and the tillers. In this situation, we have already established that (at least) the elite member with the lowest initial land holding receive land, and that the tiller member with the highest initial land holding receive land. More formally; $\lambda_{N_e}, \lambda_{N_{e+1}} = 0$.[10] We know that land will be filled on "from the top" among the tillers and "from the bottom" among the elites. Among the elite members, denote the "border" member with most initial land that also receives land by $i = eb$. Likewise, among the tiller members denote the "border" member with least initial land that also receives land by $i = tb$. Then, all elite members designated $i \geq eb$ receive land from the ruler, while all tiller members with $i \leq et$ receive land from the ruler. What remains is then to determine individuals eb and et. Since these two individuals both receive land from the ruler we have that $\lambda_{eb} = \lambda_{et} = 0$. It then follows from substituting for λ from one of the two first order conditions (A.3) and (A.4) and inserting in the other that

$$
\delta_e \left(h_e + h_e \mu'_e - N_e \left(\bar{L} - \bar{L}_e - \mu_e \right) h'_e \frac{d\sigma_e}{dL^e_{eb}} \right) = \tag{A.9}
$$
$$
\delta_t \left(h_t + h_t \mu'_t - N_t \left(\bar{L} - \bar{L}_t - \mu_t \right) h'_t \frac{d\sigma_t}{dL^t_{et}} \right)
$$

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[10]Note that in such an internal equilibrium we also have to assume that the second order conditions for maximun is fulfilled, which we thus also assume is the case in the situation we are now looking at. Note also that we can rule out the case where all agents receive land, since then all tillers would have the average amount of land while all elites would have higher than the average amount of land, which is a contradiction.

In this internal equilibrium the second order conditions are assumed to be satisfied. If they are not, this situation can not arise, and only solutions where all the land is given to one group,which we have characterized above, can constitute an equilibrium. Given this, everything that, ceteris paribus, makes the left hand side higher will result in more land being given to the elite. Similarly, everything that makes the right hand side larger will result in more land being given to tillers. It thus follows that the analysis undertaken regarding which group will get land from the ruler also applies in this case. The only difference is now that the factors that above pulled in the direction of the elite being allocated land now instead pull in the direction $i = eb$ being a low number, i.e. that many elite members are allocated land. Similarly, factors that above pulled in the direction of the tillers belong the group that is allocated land, now instead pull in the direction $i = e, t$ being a high number, i.e. that many tiller members are allocated land.

This concludes our characterization of the political equilibrium regarding who is given land, and how much each individual receives.

Endogenous Amount of Land to be Distributed I.

We now extend the model to include an endogenous amount of land distributed by the ruler. Denote the initial land of the ruler by $\bar{L}_r$. We now have that the land the ruler has after his land reform given by $L_r = \bar{L}_r - \tilde{L}_r$, where L_r, in contrast to above, is now an endogenous variable. As a consequence, the program the ruler solves is not simply to maximize his probability of remaining in power. He also has to take into account that land distribution is costly.

The program of the ruler can now again be written as in (A.2):

$$\max_{\left\{L_1^e,...,L_{N_e}^e,L_{N_e+1}^t,...,L_{N_e+N_t}^t\right\}} R + \bar{L}_r - \tilde{L}_r - \pi\left(R + \bar{L}_r - \tilde{L}_r - \bar{L}\right) \qquad \text{(A.10)}$$

subject to (A.1), (6), and $\left\{L_1^e, ..., L_{N_e}^e, L_{N_e+1}^t, ..., L_{N_e+N_t}^t\right\} \geq \left\{\tilde{L}_e^2, ..., \tilde{L}_e^n, \tilde{L}_c^{n+1}, ...\tilde{L}_c^N\right\}$.

Again, inserting from (6) taking (A.1) into account, this is a Kuhn-Tucker maximization problem. Denoting the multiplier on the (binding) constraint (A.1) by λ, and on the $N_e + N_t$ constraints $L_i^j \geq \tilde{L}_i^j$ by λ_i, and again by recalling that $\bar{L}_j = \frac{\sum_{i \in j} L_i^j}{N_j}$, the first-order conditions are that the derivatives of the maximization problem with respect to L_i^j must satisfy the following $N_e + N_t$ first order conditions:

$$\left(R + \bar{L}_r - \tilde{L}_r - \bar{L}\right) \pi'(\cdot) \left[2\delta_e \left(h_e + h_e\mu_e' - N_e\left(\bar{L} - \bar{L}_e - \mu_e\right)h_e'\frac{d\sigma_e}{dL_i^e}\right)\right] - $$

$$\text{(A.11)}$$

$$(1 - \pi) + \lambda_i = 0 \qquad \text{for} \quad i = 1, ..., N_e$$

and

$$\left(R + \bar{L}_r - \tilde{L}_r - \bar{L}\right) \pi(\cdot) \left[2\delta_t \left(h_t + h_t\mu_t' - N_t\left(\bar{L} - \bar{L}_t - \mu_t\right)h_t'\frac{d\sigma_t}{dL_i^t}\right)\right] - \quad \text{(A.12)}$$

$$(1 - \pi) + \lambda_i = 0, \qquad \text{for} \quad i = N_e + 1, ..., N_e + N_t$$

The first term of the left hand sides of (A.11) and (A.12) now represents the

expected cost of distributing one unit of land. With the probability that the ruler remains in power $1 - \pi$, this cost is paid by the autocrat himself, while if democracy is introduced the cost of redistribution of land is zero for the autocrat since, in this case, all stock positions of land assets will later be neutralized by flow redistribution. Thus, all else equal, factors that make the ruler more likely to lose power will result in more land redistribution. The intuition for this is that political land distributions in such a case become more attractive, since the probability that it is the ruler that, in effect, has to pay the future cost of land reform is smaller. Thus, it is when the ruler is weak that we should observe more and bigger land reforms.

The second term of the left hand sides of (A.11) and (A.12) is the equivalent term as in of the left hand sides of (A.3) and (A.4) in the basic model, and captures the benefit, as seen from the point of view of the ruler, of land redistribution. For this reason, it can easily be verified that all the comparative statics in the basic model is still valid. Thus our simplifying assumption in the basic model about an exogenous amount of land to be distributed is without consequence for these mechanisms.

However, we also have another important result.[11] In the extended model, observe that the ruler allocates the optimal amount of land as viewed from his own perspective. Thus, on the margin, the ruler has the same utility of keeping one unit of land for himself as he has by distributing the land (in an optimal way). In the case where land is only given to members of one of the groups, this has an important implication: the higher is initial land inequality between elites and

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[11]In fact, this result also holds in the basic model. The result is easier to formally show in the extended model, however, and thus we prove it here rather than in the basic model.

tillers, the more likely it is that is the elites that receives more land. Thus high initial land inequality makes it more likely that land inequality increases further.

Too see this latter result more formally, denote the utility of the ruler in the case where the elite group is the only group that receives land by $U(L_e^*, \tilde{L}_t)$, where now L_e^* denotes the vector of equilibrium land holdings by the elite, while $\tilde{L}_t$ denotes the vector of initial land holdings by the tillers. Since in this case no tiller gets land, $\tilde{L}_t$ is also the amount of land tillers hold after the land reform. Similarly, denote the utility of the ruler in the case where the group of tillers is the only group that receives land by $U(\tilde{L}_e, L_t^*)$, with $\tilde{L}_e$ now the vector of initial (and also the final) land holdings of the elite, and L_t^* the vector of equilibrium land holdings by the tillers. The ruler will now choose to give land to the elites if $U(L_e^*, \tilde{L}_t) > U(\tilde{L}_e, L_t^*)$, while he will choose to give land to tillers of the opposite holds. Clearly, $U(L_e^*, \tilde{L}_t)$ is decreasing in $\tilde{L}_t$. Since in this case tillers do not receive land, the ruler is better off if they have less land and he has more land (or equivalently, at the margin, he could distribute the land optimally to some of the elites). More formally, consider increasing the initial land holdings of a tiller that we denote by t. In the case where tillers do not receive land, we have that for any tiller t, $\frac{dU(L_e^*, \tilde{L}_t)}{dL_t} = -\lambda_t < 0$. Similarly, for the case where elites do not receive land we have that for any elite individual e, $\frac{dU(\tilde{L}_e, L_t^*)}{dL_e} = -\lambda_e < 0$. It follows from this that the initial higher is the land holdings of the elite and the smaller is the initial land holdings of the tillers, the more likely it is that $U(L_e^*, \tilde{L}_t) > U(\tilde{L}_e, L_t^*)$, which establishes the result.

The most simple way of giving the intuition for this result is that when a group holds much land from before, then the less additional land has to be distributed from the ruler, which in turn makes it attractive to target the group with much

land.

A.3 Endogenous land expropriation

We now extend the model to include the case where, in contract to in the basic model, the ruler does not take initial property rights for granted. The ruler may now grab land from elite or tiller individuals to redistribute to others or to himself. Thus the constraints that individual land holdings for all individuals after reform is weakly higher than before reform is no longer active. Instead, the new constraint is now that land holdings for all individuals after reform is weakly positive. The program of the ruler is now:

$$\max_{\left\{L_1^e,...,L_{N_e}^e,L_{N_e+1}^t,...,L_{N_e+N_t}^t\right\}} R + \bar{L}_r - \tilde{L}_r - \pi\left(R + \bar{L}_r - \tilde{L}_r - \bar{L}\right) \tag{A.13}$$

subject to (A.1), (6), and $\left\{L_1^e,...,L_{N_e}^e,L_{N_e+1}^t,...,L_{N_e+N_t}^t\right\} \geq \{0,...,0\}$

It can easily be verified that the first order conditions are again given by (**??**) and (A.13), albeit now $\lambda_i > 0$ has the interpretation that all the land is grabbed from agent i. Thus note that all the trade-offs in the comparative statics is as above. But now land reform is more extreme in that some individuals has the land grabbed from them, and thus the differences between individuals stemming from land reform is exacerbated.